



Requirements Document

PRC-RD-SH-11198

Storing, Using and Handling Compressed Gases

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**Project: CH2M HILL Plateau Remediation Company
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1.0 PURPOSE AND SCOPE

This Level 2 Requirements Document provides requirements for storing, handling, and using compressed gas cylinders related to CH2M HILL Plateau Remediation Company (CHPRC) scope of work.

This document also contains a detailed scope section identifying information sources related to compressed gas operations, whether or not they are related to or excluded from the scope of this document.

2.0 SCOPE

2.1 General Cylinders – 29 CFR 1910, Subpart H

The scope of this requirements document is primarily based on OSHA 29 CFR 1910, Subpart H – *Hazardous Materials*, but **only** the following sections:

- 1910.101, Compressed gases general requirements
- 29 CFR 1910.6 incorporates Compressed Gas Association (CGA) Pamphlet P-1, *Safe Handling of Compressed Gases in Containers*, as applicable to 1910.101.

NOTE: *Only the mandatory provisions (i.e., provisions containing the word “shall” or other mandatory language) of standards incorporated by reference are adopted as standards under the Occupational Safety and Health Act (OSHA). [See 1910.6(a)(1)].*

- 1910.102 - Acetylene
- 1910.103 - Hydrogen
- 1910.104 - Oxygen
- 1910.110 - Liquefied Petroleum Gas (Including Propane)
- 29 CFR 1910.6 incorporates National Fire Protection Association (NFPA) 58, [Standard for the] *Storage and Handling of Liquefied Petroleum Gases*, as applicable to 1910.110.
- 29 CFR 1910.178, *Powered Industrial Trucks*, also incorporates NFPA 58 by 1910.178(f)(2).

NOTE: NFPA 55, *Storage, Use and Handling of Compressed Liquefied Gases in Portable Cylinders*, is **not** incorporated by reference into OSHA 29 CFR 1910. It is also **not** included in the list of applicable fire codes in CGA P-1, Section 6.5. NFPA 55 does, however, contain significant information that is good business practice and also becomes mandatory by DOE O 420.1, Facility Safety.

- 1910.111 - Anhydrous Ammonia

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2.2 General Cylinders – 29 CFR 1910, Subpart Q

The scope of this requirements document is also based to a minor extent on OSHA 29 CFR 1910, Subpart Q, *Welding, Cutting and Brazing*, but **only** the following sections:

- 1910.252(b)(4)(vi) - General requirements, Protection of Personnel, Working in Confined Spaces, Gas Cylinder Shutoff.
- 1910.253 – Oxygen-fuel gas welding and cutting.

2.3 Fire Extinguishers

Portable Fire extinguishers, which frequently are or involve compressed gas cylinders, are **excluded** from the scope of this requirements document. Information regarding the subject is found in 29 CFR 1910.157.

- NFPA 10, *Portable Fire Extinguishers*, also contains information on the subject

2.4 Compressed Air

Compressed gas cylinders that are part of self-contained breathing apparatus (SCBA) units are **excluded** from the scope of this requirements document. Individual manufacturers provide information on the cylinders.

General compressed air cylinders used as part of supplied air respirator units (including SKA-PAK units) fall under the requirements of this document as it applies to the general high-pressure hazards and controls. Additional requirements, however, involved with breathing air are beyond the scope of this requirements document. Information on the subject is found in 29 CFR 1910.134, *Respiratory Protection*, and PRC-PRO-SH-120, *Respiratory Protection Program*.

Breathing air cylinders (Compressed Air) are included in the CGA list of Oxidizing gases in CGA P-1, Appendix "C." This is **not**, however, equivalent to, and is **not** to be confused with, an Oxidizer.

2.5 Chlorine Cylinders

Chlorine Cylinders (in typical DOT class 3A or 3AA cylinders) are included in the scope of this requirements document to the extent that the precautions required for the safe handling and storage of any compressed gas cylinders must be followed. Additional controls, however, must be imposed which are beyond the scope of this requirements document. For example, according to CGA, chlorine cylinders must not be stored next to cylinders containing other compressed gases. One-ton cylinders are not included in the scope of this procedure. Additional information on the subject can be found in publications by the Chlorine Institute.

2.6 Air Receivers/Pressure Vessels

General air receivers and pressure vessels are **not** within the scope of this requirements document.

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2.7 Bulk Compressed Gas Systems

Bulk gas systems are **not** in the scope of this requirements document. Installation or modification of bulk compressed gas systems requires a permit from site Fire Marshal.

More information regarding requirements for permitting is found in HNF-RD-8589, *Hanford Fire Marshal Permits*.

2.8 Procuring, Receiving, & Marking Cylinders

This requirements document does **not** cover procuring, receiving, or marking compressed gas cylinders.

FH handles all procurement, initial receiving, and inspection to be sure cylinders are properly equipped and marked. Portable cylinders for compressed gas are constructed and maintained in accordance with DOT regulations (U.S. Department of Transportation, 49 CFR, parts 171-179). Cylinders are equipped with devices identified in OSHA 29 CFR 1910, Subpart H, and CGA publications incorporated into OSHA by reference.

2.9 Transporting Cylinders

After procurement, receiving, and inspection, cylinders are transported to individual facilities where the cylinders are stored, used, and handled as covered by this requirements document.

Transportation except as a part of normal on-site handling after receipt by individual facilities is **excluded** from the scope of this requirements document.

2.10 Filling Cylinders

This requirements document does **not** cover cylinder filling. SCBA and SKA-PAK cylinder refilling is performed exclusively by the Hanford Fire Department (HFD) using specific requirements and procedures. Other cylinders are filled by off site vendors. Contracts with those vendors impose the appropriate regulations and requirements for filling. Only those cylinders designed to be refilled can be refilled.

3.0 REQUIREMENTS

3.1 General Safe Handling Requirements

NOTE: For the tables in this section under the requirement "type" column, "V" means verbatim and, "I" means interpreted.

#	Requirement	Type V or I	Source
1.	Cylinders shall not be used as rollers, supports, or for any purpose other than to contain and use the original contents.	I	29 CFR-1910.101; CGA P-1
2.	Cylinders shall not be dragged, struck, dropped, or rolled in the horizontal position, or allowed to violently strike each other or another surface.	I	29 CFR-1910.101; CGA P-1

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#	Requirement	Type V or I	Source
3.	A suitable hand truck, forklift truck, or similar handling device with the cylinder properly secured to the device shall be used when transporting cylinders.	I	29 CFR-1910.101; CGA P-1
4.	Cylinders shall be rolled only for short distances, using the curved bottom edge of the cylinder.	I	29 CFR-1910.101; CGA P-1
5.	Cylinders shall not be lifted using the protective cap or with a magnet.	I	29 CFR-1910.101; CGA P-1
6.	Ropes, chains, or slings shall not be used to suspend cylinders unless the cylinder has appropriate lifting attachments. When appropriate lifting attachments have not been provided, suitable cradles or platforms shall be used to hold the cylinder for lifting.	I	29 CFR-1910.101; CGA P-1
7.	Cylinders shall not be stored at temperatures above 125°F and shall be protected from temperature extremes.	I	29 CFR-1910.101; CGA P-1
8.	Cylinders shall be inspected prior to use. Inspection will include checking for dents, bulges, cracks, evidence of excess heat, etc. A cylinder shall not be used if damaged.	I	29 CFR-1910.101; CGA P-1
9.	Cylinder users shall ensure that all connecting devices are free of oil, grease, or other contaminants.	I	29 CFR-1910.101; CGA P-1
10.	When valve protection caps or valve outlet caps and/or plugs are provided by the manufacturer, these items shall remain on the cylinder at all times except when the cylinder is secured and connected to dispensing equipment.	I	29 CFR-1910.101; CGA P-1
11.	All gas cylinders shall be secured, whether in service or storage, to prevent falling.	I	29 CFR-1910.101; CGA P-1

3.2 Training Requirements

#	Requirement	Type V or I	Source
1.	<p>Compressed gases shall be handled and used only by properly trained persons.</p> <p>NOTE 1: CGA P-1 defines "handling" as "Moving, connecting or disconnecting a compressed or liquefied gas container under normal conditions of use."</p> <p>NOTE 2: Training course #020049, Compressed Gas Cylinder Safety, or equivalent, meets this requirement.</p>	I	29 CFR-1910.101; CGA P-1

3.3 Emergency Response Plan Requirements

#	Requirement	Type	Source
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NOTE: Before each use, check CHPRC Docs Online to ensure this copy is current.

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		V or I	
1.	An approved emergency response plan must cover compressed gas cylinders in the area.	I	29 CFR-1910.101; CGA P-1
2.	Only authorized personnel operating under an approved emergency response plan shall respond to an emergency involving compressed gas cylinders.	I	29 CFR-1910.101; CGA P-1

3.4 Storing Cylinders - General requirements

#	Requirement	Type V or I	Source
1.	Compressed gases shall be stored and posted according to their hazard class (flammable, asphyxiant, etc.) or name of gas to be stored.	I	29 CFR-1910.101; CGA P-1
2.	Storage areas shall be constructed so that they are dry, well ventilated, and made with noncombustible materials. Shelves must be able to support cylinders.	I	29 CFR-1910.101; CGA P-1
3.	Noncombustible or limited-combustible construction shall be used (concrete/asphalt is the preferred building material) for the floors of storage areas.	I	29 CFR-1910.101; CGA P-1
4.	Consideration shall be given to separating empty cylinders from full ones. NOTE: <i>It is suggested that all empty cylinders be marked "empty", unused cylinders "full", and those in service "In Use." All empty cylinders should be treated as if full. For example, cylinders that held oxidizing gases and flammable gases should not be stored together.</i>	I	29 CFR-1910.101; CGA P-1
5.	Valves on empty cylinders shall be closed and capped.	I	29 CFR-1910.101; CGA P-1
6.	Prolonged exposure to the ground (earth) or to damp environment shall be avoided. Subsurface storage locations shall be avoided.	I	29 CFR-1910.101; CGA P-1
7.	Cylinders shall be protected from any object that will produce a harmful cut or other abrasion in the surface of the metal. Cylinders shall not be stored near elevators, walkways, unprotected platform edges, or in locations where heavy moving objects may strike or fall on them.	I	29 CFR-1910.101; CGA P-1
8.	"NO SMOKING" signs shall be posted at all flammable gas storage areas.	I	29 CFR-1910.101; CGA P-1
9.	Oxidizers shall be stored separately from flammable gas containers or combustible materials (especially oil or grease). A distance of 20 feet (6 meters) or a noncombustible barrier at least five feet high having a fire resistance rating of at least one-half hour is considered a minimum requirement.	I	29 CFR-1910.101; CGA P-1

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#	Requirement	Type V or I	Source
10.	For requirements regarding specific gases such as acetylene, hydrogen, oxygen, or for toxic or corrosive gases, the Material Safety Data Sheets (MSDS) shall be consulted for appropriate guidance on the storage and compatibility requirements of the materials in question and/or the gas supplier shall be contacted.	I	29 CFR-1910.101; CGA P-1
11.	When using compressed gas for welding operations, additional requirements found in 29 CFR 1910.252(b)(4)(vi) and 1910.253 shall be met.	I	29 CFR-1910.101; CGA P-1; 29 CFR 1910.252 (b)(4)(vi) and 1910.253.
12.	Transporting compressed gas cylinders in automobiles or in closed-bodied vehicles (per CGA P-1 section 3.9) shall be discouraged. Shipping compartments shall be adequately ventilated. NOTE: <i>Although general transportation is outside the scope of this requirements document, information on the subject can be found in DOE O 460.1A, Packaging and Transportation Safety, CRD. Additional information is found in PRC-PRO-TP-156, Onsite Hazardous Material Shipments, and PRC-PRO-TP-157, Offsite Hazardous Material Shipments.</i>	I	29 CFR-1910.101; CGA P-1

4.0 SOURCES

4.1 Requirements

29 CFR 1910, Subpart H (Hazardous Materials)

29 CFR 1910, Subpart Q (Welding, Cutting and Brazing)

Compressed Gas Association (CGA) Pamphlet P-1 (2000 Issue), *Safe Handling of Compressed Gases in Containers*

NFPA 58, *Storage and Handling of Liquefied Petroleum Gases*

4.2 References

29 CFR 1910.134, *Respiratory Protection*

29 CFR 1910.157, *Portable Fire Extinguishers*

29 CFR 1926.350, *Gas Welding and Cutting*

29 CFR 1926.351, *Arc Welding and Cutting*

49 CFR, *Transportation*, Parts 171-179 (U.S. Department of Transportation)

DOE O 460.1A, *Packaging and Transportation Safety*, Contractor Requirements Document (CRD)

DOE O 420.1, *Facility Safety*

PRC-PRO-SH-120, *Respiratory Protection Program*

PRC-PRO-TP-156, *Onsite Hazardous Material Shipments*

PRC-PRO-TP-157, *Offsite Hazardous Material Shipments*

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HNF-RD-8589, *Hanford Fire Marshal Permits*

NFPA 10, *Portable Fire Extinguishers*

NFPA 55, *Storage, Use and Handling of Compressed Liquefied Gases in Portable Cylinders*